

*CHOICES BETWEEN POSITIVE AND NEGATIVE
REINFORCEMENT DURING TREATMENT FOR
ESCAPE-MAINTAINED BEHAVIOR*

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Positive reinforcement was more effective than negative reinforcement in promoting compliance and reducing escape-maintained problem behavior for a child with autism. Escape extinction was then added while the child was given a choice between positive or negative reinforcement for compliance and the reinforcement schedule was thinned. When the reinforcement requirement reached 10 consecutive tasks, the treatment effects became inconsistent and reinforcer selection shifted from a strong preference for positive reinforcement to an unstable selection pattern.

DESCRIPTORS: differential reinforcement, compliance, choice, escape-maintained behavior, behavioral economics

Recent studies have demonstrated that positive reinforcement for task compliance can increase compliance and decrease escape-maintained problem behavior even when problem behavior continues to result in escape (Lalli et al., 1999; Piazza et al., 1997). Moreover, participants in the study by Lalli et al. continued to display low levels of problem behavior when the negative reinforcement schedule for problem behavior was far denser than the positive reinforcement schedule for compliance. These authors suggested that the value of positive reinforcement exceeded that of negative reinforcement even when schedule discrepancies favored the latter.

In the current study, we first reexamined the relative effects of positive and negative reinforcement for compliance, without extinction, on levels of compliance and escape-

maintained problem behavior. We then reexamined potential changes in the relative value of positive and negative reinforcement as a function of increasing reinforcement schedule values. However, unlike Lalli et al. (1999), the second analysis was conducted while problem behavior was on extinction and positive or negative reinforcement could be earned only through appropriate behavior. A direct comparison of the relative value of positive and negative reinforcement was made using a chained schedule procedure in which completion of the required number of tasks produced the opportunity to choose positive or negative reinforcement.

METHOD

Participant and Target Behaviors

Samantha, a 10-year-old girl who had been diagnosed with autism, had been admitted to an inpatient unit for the assessment and treatment of severe behavior disorders. Samantha communicated using three- to four-word phrases and followed multistep instructions. Her aberrant behaviors included self-injury (scratching herself),

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aggression (hitting, kicking, pinching, pushing, or scratching others) and disruption (throwing objects and destroying materials).

Procedure, Experimental Design, and Interobserver Agreement

Functional analysis. A functional analysis, using the methods described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994), was conducted to determine the environmental variables that maintained Samantha's aberrant behavior. Attention, demand, tangible, alone, and toy play conditions were alternated in a multielement design. Sessions during these and all subsequent conditions were conducted in a classroom on the unit and lasted 10 min. The tangible item used in the functional analysis was identified via a systematic preference assessment and consisted of the top-ranked item (coloring books and crayons).

Baseline. Baseline conditions were identical to the demand condition of the functional analysis. All instructional demands were presented using sequential verbal, gestural, and physical prompts. Aberrant behaviors produced a 30-s escape from the instructional sequences. Compliance, defined as completion of the task following either the verbal or the gestural prompt, resulted in brief verbal praise. Tasks selected from Samantha's education plan were alternated in a quasirandom order throughout each session.

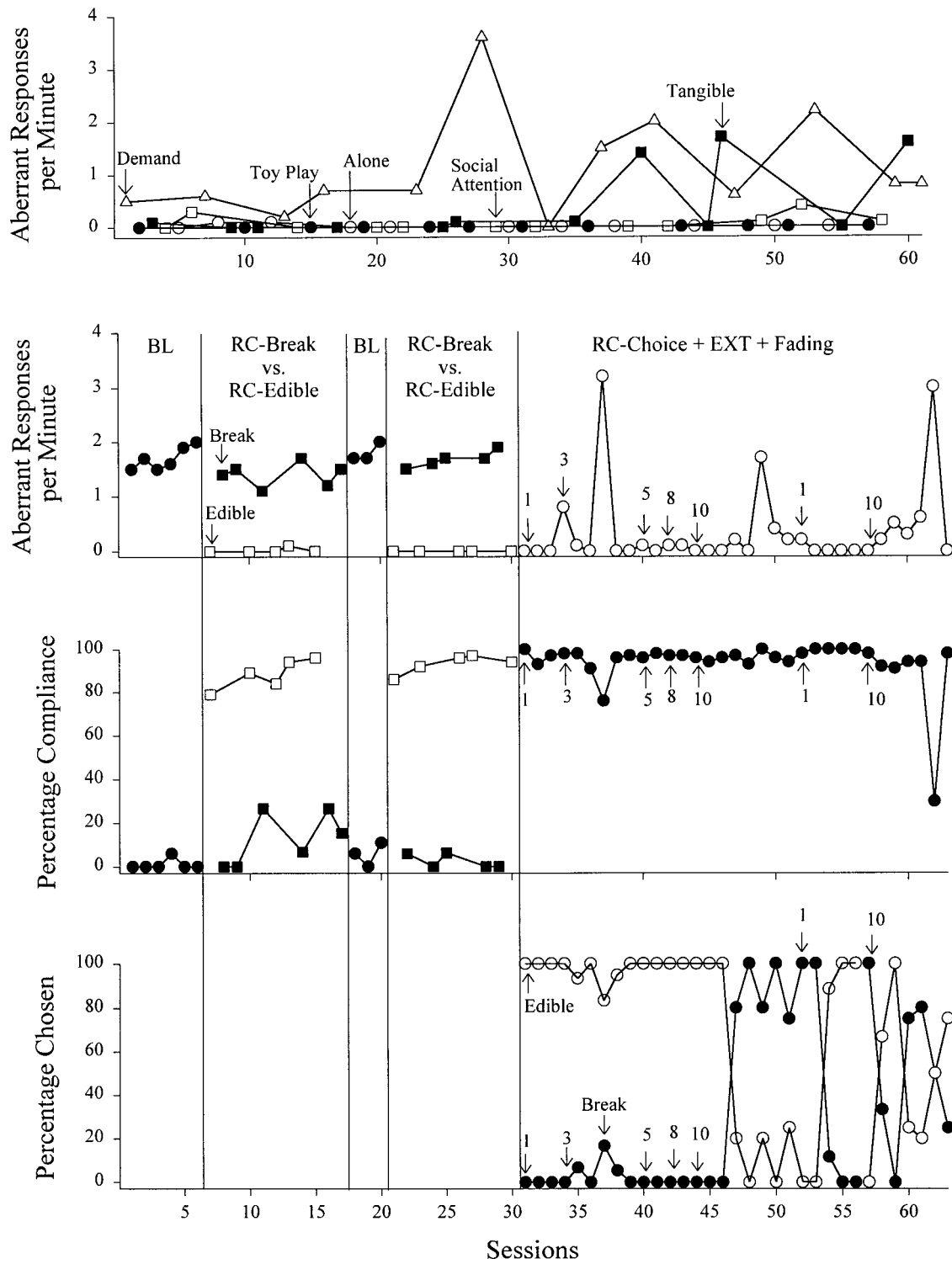
Reinforcement of compliance with edible reinforcer (RC-edible) versus reinforcement of compliance with break (RC-break). A combined multielement and reversal design was

used to compare the relative efficacy of providing negative (a 30-s break) or positive (a potato chip) reinforcement for compliance while problem behavior continued to produce a 30-s escape. The potato chip was identified as the second-highest ranked item in the systematic preference assessment conducted just prior to the functional analysis. Samantha was first trained to request reinforcers by handing the therapist a picture symbol card for one or the other reinforcer after each compliance (different cards were used for edible reinforcers and 30-s breaks). Following training, one of the cards was made available contingent on task compliance on a fixed-ratio 1 schedule during each session. During sessions in which only edible reinforcement was available, the reinforcer was delivered immediately after Samantha handed the card to the therapist and the instructional sequence resumed immediately after delivery of the chip (hence the use of edible items instead of activities).

Reinforcement of compliance with choice of reinforcers (RC-choice) plus extinction plus fading. Escape extinction was then added to the treatment (i.e., aberrant behavior ceased to produce escape), and compliance resulted in an opportunity to choose between concurrently available positive and negative reinforcement. When Samantha met the programmed schedule requirement, both cards were placed in front of her and she was permitted to choose either the edible reinforcer or a 30-s break by handing the therapist the corresponding card. Positive and negative reinforcement could therefore be obtained

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Figure 1. Rates of aberrant behavior during conditions of the functional analysis (top panel). Rates of aberrant behavior (second panel) and levels of compliance (third panel) during baseline, reinforcement conditions with positive reinforcement without extinction (RC-edible) and negative reinforcement without extinction (RC-break), and differential reinforcement with choice of positive or negative reinforcement (RC-choice + EXT + fading). The bottom panel depicts the distribution of choices between edible reinforcers and breaks. The arrows indicate the number of completed tasks required to earn the opportunity to choose.



through roughly identical contingencies. This arrangement was used to isolate the effects of schedule increases on choices between positive and negative reinforcement by minimizing the effects of other variables (e.g., differences in response effort) that might have influenced choice allocation. The schedule requirements for reinforcement started at completion of a single task without any intervening problem behavior. Work requirements were gradually increased across sessions to three or more consecutively completed tasks. If problem behavior occurred prior to completion of the schedule requirements, the number of completed tasks was reset to zero. Thus, the number of completed tasks required to earn the opportunity to choose depended on the absence or presence of problem behavior but corresponded, at minimum, to the schedule value assigned to each session.

Trained observers used laptop computers to collect frequency data on problem behavior, task presentation, and compliance across phases. During RC-choice plus extinction plus fading, observers also recorded which reinforcer Samantha selected. Interobserver agreement data on problem behaviors and compliance were collected during 52% of all sessions. Exact agreement coefficients averaged 95.7% (range, 52.5% to 100%) for problem behavior and 90.1% (range, 70.5% to 100%) for compliance. Agreement data on reinforcer selection were collected during 31% of the RC-choice plus extinction plus fading sessions and averaged 98.7% (range, 73.8% to 100%).

RESULTS AND DISCUSSION

Figure 1 displays the results of all the analyses. The functional analysis suggested that problem behaviors were maintained by escape from demand and possibly by access to tangible items. During baseline, rates of problem behavior averaged 1.7 responses per

minute, while compliance averaged only 2.6%. When we compared the effects of reinforcing compliance with positive versus negative reinforcement, compliance increased and problem behavior decreased only during the RC-edible condition. During RC-choice plus extinction plus fading, problem behavior was low when the schedule requirements for compliance were low (with the exception of Session 37), and Samantha consistently chose positive reinforcement. As the schedule requirements were increased, destructive behavior increased slightly after a few sessions at 10 consecutively completed tasks, and Samantha displayed a preference for negative reinforcement during the last five sessions. When the schedule requirements were reversed to one task, problem behavior again decreased to zero beginning with the second session. Samantha continued to choose negative reinforcement during the first two sessions, but a reversal in preference was observed beginning with the third session. Finally, when the schedule returned to 10 tasks, problem behaviors once again became more variable, as did the distribution of selections between positive and negative reinforcement.

The results of this study replicate previous research that has demonstrated the effectiveness of positive reinforcement in the treatment of escape-maintained behavior. In addition, they lend support to previous findings suggesting the superiority of positive over negative reinforcement for compliance under dense reinforcement schedules (Lalli *et al.*, 1999). These results also support behavioral economic research suggesting that increasing work requirements can alter the relative value of concurrently available reinforcers (e.g., Tustin, 1994). Samantha displayed a strong preference for positive reinforcement when few completed tasks were required but displayed unstable preferences when 10 tasks were required, an outcome consistent with the preference reversal re-

ported by Tustin. Moreover, the present study suggests one possible mechanism underlying this sort of preference reversal. We speculate that increasing the work requirements directly affected preferences as an establishing operation that (a) enhanced the value of a break from work as a reinforcer and (b) increased the probability of behaviors that presently (choosing break) or historically (destructive behavior) resulted in escape from work. However, in light of the instability of choices and the inclusion of a single participant, future studies should examine the durability and generality of this effect.

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